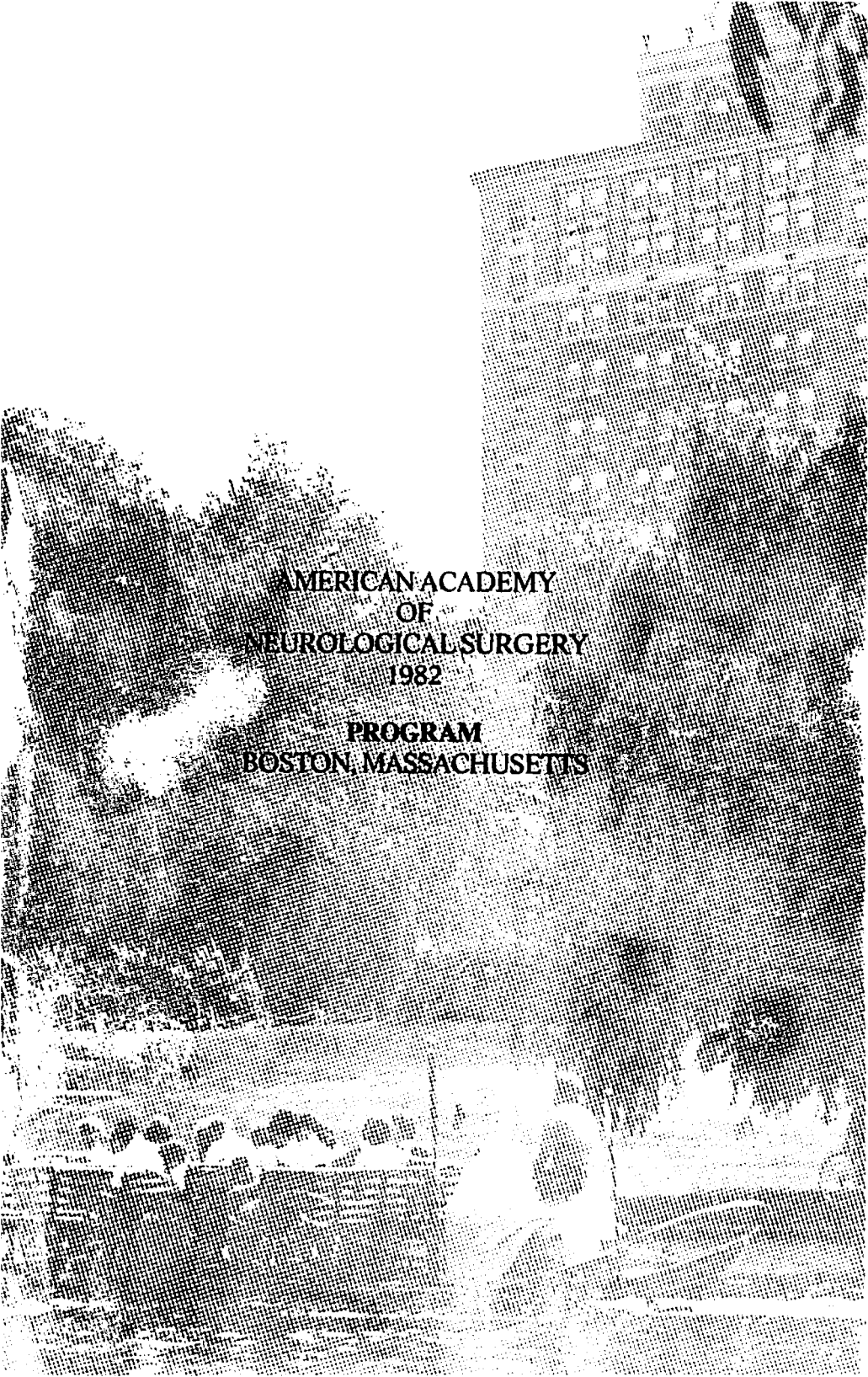

AMERICAN ACADEMY OF NEUROLOGICAL SURGERY

1982

PROGRAM

BOSTON, MASSACHUSETTS

ANNUAL MEETING OF THE
AMERICAN ACADEMY OF
NEUROLOGICAL SURGERY
1982

RITZ-CARLTON HOTEL
BOSTON, MASSACHUSETTS
OCTOBER 10 – 13, 1982

1982 Officers and Committees

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Subcommittee on Corresponding Membership
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David G. Kline

Local Hosts
Thalia and Nicholas Zervas

PROGRAM 1982

REGISTRATION (Ritz-Carlton Hotel)

Sunday, October 10	3:00-6:00 p.m.
Monday, October 11	6:45-9:00 a.m. 2:00-5:00 p.m.
Tuesday, October 12	8:00-10:00 a.m.

SUNDAY, OCTOBER 10

6:00-8:30 p.m.	Welcoming Cocktail Party Isabella Stewart Gardner Museum (Through the courtesy of the Trustees of the Isabella Stewart Gardner Museum.) (Shuttle buses run from the Ritz-Carlton to the Museum 5:30-9:00 p.m.)

MONDAY, OCTOBER 11

7:00-8:00 a.m.	Breakfast Business Meeting (Academy Members Only) Ritz-Carlton Room
8:00 a.m.	Buses leave the Ritz-Carlton for Harvard Medical School
8:30-12:00 noon	Symposium on Neuroscience Harvard Medical School, Amphitheater D
12:00-1:00 p.m.	Luncheon Harvard School of Public Health
12:30-1:30 p.m.	Buses return to the Ritz-Carlton
1:30-2:50 p.m.	Scientific Session Ballroom
2:50-3:10p.m.	Coffee Break
3:10-3:40 p.m.	Academy Award
3:40-4:40 p.m.	Scientific Session Ballroom
6:00 p.m.	Buses leave from the Ritz-Carlton for the John F. Kennedy Memorial Library

7:00-10:00 p.m.	Guided tour of the John F. Kennedy Memorial Library. New England Lobster and Clam Bake with entertainment by chanteyman Bill Schustik

TUESDAY, OCTOBER 12

7:00-8:00 a.m.	Breakfast and Business Meeting (Academy Members Only) Ritz-Carlton Room
8:00-10:00 a.m.	Scientific Session Ballroom
10:00-10:20 a.m.	Coffee Break
10:20-11:00 a.m.	Scientific Session Ballroom
11:00-12:00 noon	CNS Neoplasms in the 80's Panel Presentation and Open Discussion Ballroom
12:15-1:00 p.m.	Presidential Address - Byron Pevehouse Ballroom
1:00-2:00 p.m.	Luncheon Ritz-Carlton Room
2:00-3:40 p.m.	Scientific Session Ballroom
7:00-8:00 p.m.	Cocktail Reception Ritz-Carlton Room
8:00-12:00 midnight	Dinner Dance (Black Tie) Ballroom

WEDNESDAY, OCTOBER 13

8:00-9:45 a.m.	Scientific Session Ballroom
9:45-10:10 a.m.	Coffee Break
10:10-12:00 noon	Scientific Session Ballroom
12:00 noon	Academy Meeting Ends

OPTIONAL PROGRAM

Harvard Medical School Bicentennial Celebration

WEDNESDAY, OCTOBER 13

6:30-10:00 p.m. — Formal Dinner and Theater
Memorial Hall/Sanders Theater, Cambridge

THURSDAY, OCTOBER 14

9:00-11:30 a.m. — Academic Convocation
The Quadrangle, Harvard Medical School
Boston

LADIES PROGRAM 1982

SUNDAY, OCTOBER 10

6:00-8:30 p.m. — Welcoming Cocktail Party
Isabella Stewart Gardner Museum
(Through the courtesy of the Trustees of the Isabella Stewart Gardner Museum.)

MONDAY, OCTOBER 11

9:00-2:00 p.m. — Guided Bus Tour of Cambridge and Museums of Harvard
Luncheon at the Hampshire House

7:00-10:00 p.m. — Guided Tour of the John F. Kennedy Memorial Library. New England Lobster and Clam Bake with entertainment by chanteyman Bill Schustik

TUESDAY, OCTOBER 12

9:00-3:00 p.m. — Guided Bus Tour of Lexington and Concord
Luncheon at the Colonial Inn of Concord

7:00-8:00 p.m. — Cocktail Reception
Ritz-Carlton Room

8:00-12:00 a.m.	Dinner Dance (Black Tie) Ballroom

WEDNESDAY, OCTOBER 13

9:00-12:00 noon	Guided Walking Tour of Beacon Hill Townhouses

SCIENTIFIC PROGRAM

AMERICAN ACADEMY
OF
NEUROLOGICAL SURGERY
BOSTON, MASSACHUSETTS
OCTOBER 10-13, 1982
SCIENTIFIC PROGRAM

MONDAY, OCTOBER 11	**Harvard Medical School** **Amphitheater D**
8:00 a.m.	Buses leave the Ritz-Carlton for Harvard Medical School
8:30 a.m.	Opening remarks by Byron Pevehouse President, American Academy
8:35 a.m.	Welcome - Daniel Tosteson, Dean Harvard Medical School
8:40-12:00 noon	**SYMPOSIUM ON NEUROSCIENCE** MODERATOR: N. ZERVAS
8:40-9:20 a.m.	Dr. David Hubel
9:20-10:00 a.m.	Dr. Daniel Tosteson
10:00-10:15 a.m.	Coffee Break
10:15-10:55 a.m.	Dr. Joseph Martin
10:55-11:35 a.m.	Dr. Norman Geschwind
11:35-12:00 p.m.	Round Table Discussion - Drs. Tosteson, Hubel, Martin, and Geschwind
12:00-1:00 p.m.	Luncheon Harvard School of Public Health
12:30-1:30 p.m.	Buses leave for Ritz-Carlton Hotel

SCIENTIFIC SESSION

Ritz-Carlton Ballroom

MODERATOR: J. AUSMAN

1:30 p.m.

1. ORBITAL TUMORS: TECHNICAL OBSERVATIONS IN 291 CASES

J.C. Maroon
J.S. Kennerdell

Since 1975 we have used a team approach in the evaluation and treatment of over 291 patients with orbital tumors, pseudo-tumors, and dysthyroid exophthalmopathy. This series includes the following:

1. Hemangioma	17	7. Hemangiopericytoma	3
2. Optic Nerve Glioma	6	8. Adenoid Cystic Carcinoma	5
3. Meningioma	25	9. Lymphangioma	18
4. Neurofibroma	3	10. Metastatic Tumor	75
5. Rhabdomyosarcoma	2	11. Pseudo-Tumor	72
6. Dermoid	30	12. Dysthyroid Exophthalmus	35

The purpose of this report is to summarize and illustrate our indicatons and surgical techniques for managing patients with various intraorbital lesions.

Primary optic nerve meningiomas are removed either through a transcranial operation or a lateral microsurgical approach. The timing of surgery and the approach used is determined by the results of CAT scanning and the patients clinical findings particularly visual function assessment. A meningioma located in the anterior half of the optic nerve sheath in a patient with preserved visual acuity is removed through a lateral microsurgical approach. If there is axial spread of the tumor into the apex, a transcranial operation is used. Optic nerve gliomas are removed transcranially after confirmation, at times, with CT guided fine needle aspiration biopsy as developed by one of the authors (JK).

Other primary intraorbital tumors are removed through a lateral microsurgical orbitotomy if the tumor on computed tomography is located in the superior, lateral, or inferior quadrant in relation to the optic nerve. A lesion medial to the optic nerve but not deep in the apex may be approached through a medial orbitotomy using specially designed

instrumentation. We have also developed a new technique for performing a four-wall orbital decompression for malignant exophthalmus.

We will demonstrate our modifications and instrumentation for the transcranial approach to the orbit, the microsurgical lateral orbitotomy, the microsurgical medial orbitotomy, the micro-technique for removing subdural optic nerve meningiomas, the lateral orbital approach for four wall decompression of the orbit for dysthyroid exophthalmus, and the technique for fine needle aspiration biopsy of orbital lesions using computed tomography.

1:50 p.m.

2. EVALUATION OF FETAL HYDROCEPHALUS

C.C. Duncan
F.A. Chervenak
R.L. Berkowitz

The fetus suspected of hydrocephalus has long represented a significant problem for the obstetrician. The development and widespread use of real-time ultrasound (US) has provided a means to evaluate hydrocephalus in utero. Between January 1979 and April 1982, 116 patients at risk or suspected of having hydrocephalus were evaluated at this institution. Of these patients 87 had negative studies, 77 were confirmed as negative following delivery. 1 patient studied initially at 24 wks had a positive study at 34 wks at another institution and 9 patients remain undelivered. An additional patient had an initial equivocal study and no follow-up is available.

28 patients demonstrated hydrocephalus by US. Gestational ages in weeks at the time of diagnosis were ‹24 in 4, 25-28 in 7, 29-32 in 7, 33-36 in 6, and 37 + in 4. Cortical mantle was ‹1.0 cm in 10, equal to 1.0 cm in 3, ›1.0 cm in 10 and measurements are not available in the 5 others. From follow-up studies, examination, and post mortem results 7 patients were found to have hydrocephalus without other anomalies; 7 also had myelomeningocele; 13 had other anomalies; and in one no further information could be obtained. In the 28 patients 5 were aborted, 7 underwent cephalocentesis, 10 had Cesarian section, 4 had vaginal deliveries, and an additional 2 underwent intrauterine shunting and Cesarian section. The outcome in the group consisted of 5 abortuses, 5 stillbirths, 8 deaths in the first post natal week, 2 deaths after the first week, and 8 survived, all of whom required ventriculoperitoneal shunting in the neonatal period. The technique for in utero shunting will be discussed.

The intrauterine diagnosis of hydrocephalus permits a wider range of decisions to be made regarding delivery and care which include no intervention, abortion, encephalocentesis, early delivery, or intrauterine shunting. The most appropriate alternative depends upon the particular US findings, discussion with the family, and an improved understanding of the relation of therapy to outcome.

2:10 p.m.

3. SURGICAL INDICATIONS AND RESULTS IN PATIENTS WITH CEREBRAL AVM'S

A.J. Luessenhop

Based upon review of over 400 patients with cerebral arteriovenous malformations the author presents his grading scheme an estimate of natural history useful for selection of patients for direct surgical excision or intravascular approach alone. It is estimated that the maximum bleeding rates during midlife are one percent for lesions that have never bled and 3.8 percent for lesions with a prior history of bleeding. The results in 80 patients who underwent direct surgical excision will be discussed, emphasizing the etiologies for mortality and morbidity. It is now estimated that at least 65 percent of all cerebral AVM's can be surgically excised with a morbidity and mortality less than that of the natural history.

2:30 p.m.

4. HYPOTHERMIA AND ELECTIVE CARDIAC ARREST IN DIFFICULT NEUROSURGICAL CASES

G.D. Silverberg

We have had experience with 15 neurosurgical cases where hypothermia and elective cardiac arrest proved useful in the definitive management of hazardous surgical lesions. We have identified three kinds of cases where the technique seems useful:

(1) Giant aneurysms: Those with sacs greater than 2.5cm in any one diameter.

(2) Complex aneurysms: Aneurysms that are multilobulated, adjacent (kissing) aneurysms or large aneurysms without a neck.

(3) Hemangioblastoma of the medulla.

Of the aneurysms,two arose from the basilar head, five from the carotid and six originated from the middle cerebral artery. Seven of the 13 (54%) had bled. The remainder presented with mass effect, seizures or emboli from clot within the aneurysm. Two hemangioblastomas arose within the medulla at the posterior end of the IV ventricle. One had had a previous partial excision.

All patients were cooled by a combination of surface cooling and a heat-exchange pump. Perfusion during cardiac arrest was carried out through femoral cannulation without thoracotomy. Cooling was carried down to 16°-20°C while perfusion was maintained at 2500-3500 cc/min with a pump oxygenator.

We found that shutting off the cerebral circulation for a period of time up to 40 minutes was well tolerated by the patients and afforded excellent visualization of the complex vascular anatomy at the base of the giant aneurysms. With circulatory arrest, the hemangioblastomas detumesced and be separated from the medulla.

We have had no operative deaths. There have been two serious neurological complications. One patient developed an hemianopia 6 months after clipping a basilar head giant aneurysm, thought to be due to late thrombosis of a posterior cerebral artery. A second patient, operated on for a giant middle cerebral aneurysm, developed an hemorrhagic infarction of the cerebellum and pons, probably from a particulate embolus from the pump. She is recovering slowly but at present is a poor result. We have had four cases of thrombophlebitis, two with a small peripheral pulmonary emboli. All recovered on anticoagulants.

Although not necessary for the vast majority of aneurysms and brain tumors, circulatory arrest does provide far better operative control of selected vascular lesions. There have been significant recent improvements in techniques of pump perfusion, control of body temperature, and control of clotting failure. Operating time has also been reduced significantly because of these advances, making the procedure safer and less time-consuming than in earlier years.

2:50-3:10 p.m. **Coffee Break**

3:10 p.m. ACADEMY AWARD

Trigeminal Projection to Supratentorial and Dural Blood Vessels: Possible Pathway in Intracranial Pain Transmission.

Marc Mayberg

MASSACHUSETTS GENERAL HOSPITAL

SCIENTIFIC SESSION

MODERATOR: G. OJEMANN

3:40 p.m.

5. **ANTERIOR CALLOSTOMY FOR INTRACTABLE EPILEPSY: CRITERIA FOR CLINICAL SELECTION AND RESULTS**

R. Marino

Twenty-two patients were submitted to partial microsurgical callosotomy since February 1978, their ages ranging from 6 to 42 years. In two cases the section involved also the trunk of the callosum; and in one case a selective split of the trunk of the callosum was performed. In two patients a unilateral mesial cortical resection of the main electrocorticographic abnormal areas exposed was also carried out.

Our selection criteria for surgery was based on uncontrollable multiform seizures, with duration of the epilepsy of at least four years, and EEG's demonstrating generalized bi-synchronous spike and slow-wave discharges, poli-spike and slow-wave and multiple spike discharges, with or without focal or multifocal accentuation, and with normal or abnormal background activity. Patients with profound mental retardation were not accepted for surgery.

We tentatively divided our patients in four groups, ranging from generalized epilepsies, secondary generalized epilepsies, hemispherectomy candidates and a miscellaneous group, the latter patients not being included in the strict selection criteria used for the 3 former groups.

All these patients were studied from the neurological, neuropsychological, neuroradiological, electroencephalography, psychiatric and social standpoints.

The surgical procedure consisted either of a frontal para-sagittal craniotomy, using a trephine opening or, as in the latter cases, of larger

frontoparietal craniotomies to make it possible the investigation of the mesial areas with electrocorticography under local anesthesia. This allowed us to better follow the electrographic abnormalities and plan the extension of the commissural section, suited to each case in particular. The callosal fibers were divided by careful suction under the microscope and a radiopaque marker over the resected portion provided a critical control of the extension of the lesion.

Our results varied according to the group of patients considered, and amelioration was characterized mainly for a disruption of the bysynchrony, marked reduction in the frequency of absences, atonic fits, tonic axial seizures and myoclonic seizures, startle induced or not. We also found a marked decrease in the frequency of local seizures. This improvement in seizure frequency and duration was also accompanied by a global improvement in attention and neuropsychological performance and adaptation. Some patients resumed their formal education actively after surgery. Patients that had a characterist preoperative disturbance of consciousness (66%), characterized by a fluctuation of awareness from normal to somnolence, became more active, organized better their thoughts, were easier to approach and understood better the environment.

Further clinical, neuropsychological and technical data will be the object of the presentation.

4:00 p.m.

6. SPEECH AND MEMORY EVALUATION WITH CT CORRELATION IN PATIENTS UNDERGOING STEREOTACTIC THALAMOTOMY

J.S. Walker
J. Horner
D.E. Bullard
D.R. Osborne
B.J. Nashold, Jr.

Thalamic lesions have been reported to cause a variety of speech and memory disorders. The role of the thalamus in higher cortical functioning, however, is not well-defined. Using patients undergoing ventrolateral stereotactic ablations as a test population, we have attempted to prospectively evaluate the role of the thalamus in speech and memory functioning. We have prospectively evaluated 24 patients undergoing stereotactic procedures at Duke University. Fifteen of these patients underwent a unilateral stereotactic thalamotomy for a variety of syndromes. The patients were evaluated pre- and postoperatively by standard neurologic examination and by a battery of sixteen tests to determine language and memory function including, orientation, memory,

primary language, secondary language, speech apraxia and dysarthria. Pre- and postoperative unenhanced CT scans were also performed to demonstrate the neuroradiologic site of the stereotactic lesion and to delineate the extent of associated edema or hemorrhage. Three of 8 patients undergoing left thalamotomy developed a significant postoperative expressive disorder, while 2 patients demonstrated improvement in memory functioning. Two of 7 patients undergoing right thalamotomy developed speech disorders which resolved within 5 days of surgery. Three of these 7 patients demonstrated postoperative improvement in their memory testing. Repetition of phrases and fluency of spontaneous speech were the functions most likely to worsen postoperatively, while immediate memory and recent memory were the areas most likely to improve. Patients that developed significant language deficits after thalamotomy all demonstrated edema involving the internal capsule or pulvinar. Small hemorrhages at the site of the lesion did not appear to affect speech or memory functions. Preliminary evaluation of our data supports the role of the thalamus in high functioning in humans. Further follow-up testing and higher resolution CT scans may allow better understanding of the anatomic substrate and the natural history of speech and memory functioning.

4:20 p.m.

7. LOCALIZATION OF VISUOSPATIAL FUNCTIONS IN NON-DOMINANT CORTEX AS DERIVED FROM ELECTRICAL STIMULATION MAPPING

G.A. Ojemann

Localization of function in human cortex is generally accepted. For language processes in the cortex of dominant hemisphere, this localization has been extensively studied, with findings of very discrete, and often differential localization. But there are few studies of the cortical localization of visuospatial function in the nondominant hemisphere. We have investigated that for several visuospatial functions: perception and memory for angles and faces, identification of facial emotional expressions, overlapping figures, rotation of complex figures, and several simple arithmetic operations in 14 patients undergoing craniotomy in the nondominant hemisphere for treatment of medically intractable epilepsy, using the electrical stimulation mapping technique. Discrete localization of these visuospatial functions was regularly demonstrated, with different cortical sites often related to different functions in the same patients. This includes identification of different sites related

to simple multiplication or division, and sites related only to interpretation of facial emotional expressions. Comparison of patterns of localization between patients suggests that posterior parieto-occipital lobe is related to visuospatial perception, posterior superior temporal gyrus to storage functions of visuospatial memory and posterior inferior frontal gyrus to retrieval function of visuospatial memory. Different portions of posterior middle temporal gyrus were related to manipulation of complex visuospatial material and to interpretation of facial emotional expressions.

TUESDAY, OCTOBER 12

NEUROBIOCHEMISTRY AND NEUROSURGERY

MODERATORS: N. ZERVAS, R. WURTMAN

8:00 a.m.

8. **ACADEMY SPECIAL LECTURE**
NEUROTRANSMITTERS AND NEUROPEPTIDES: A REVIEW FOR NEUROSURGEONS

R. Wurtman

8:40 a.m.

9. **NORADRENERGIC CONTROL OF DORSAL HORN SENSORY PROCESSING: ERRORS IN ASSUMPTIONS**

C.J. Hodge, Jr.
R.B. King

Retrograde transport of Horseradish Peroxidase injected into the lumbar spinal cord indicates that one of the major sources of descending input to the spinal cord is from the dorsal lateral pons in the region of the locus coeruleus (LC) and the parabrachial nuclei (PB). Mapping of the locations of catecholamine (CA) containing cells also shows a high number of such cells in the LC and PB areas. Since essentially all CA in the cord is from suprasegmental sources, the assumption has been made that the LC and PB areas are the major source of spinal CA. Stimulation of LC in cat caused a predominantly inhibitory effect on cells of the dorsal horn processing both noxious and innocuous stimuli. While the lowest thresholds for eliciting this inhibition were found in

LC, the effect was not altered by depleting the spinal cord of CA with intrathecal 6-hydroxydopamine. Thus the assumption linking the LC - PB area to descending CA systems in the cat was in error. Retrograde transport of Evans Blue (EB) from the cord to the pons was then studied. This allows determination of cells that project to the cord, cells that contain CA, and cells that both project to the cord and contain CA. The majority of cells in the LC - PB area that contain CA do not project to the cord and the majority of cells that project do not contain CA. The primary area in the brain stem that contained cells that both projected to the cord and contained CA was in the more ventral and lateral pons in the region of the Kölliker-Fuse nucleus. The finding that the Kölliker-Fuse nucleus is the primary source of spinal CA has major implications for those studying both descending and ascending catecholaminergic systems.

9:00 a.m.

10. EFFECTS OF SPINAL HEMISECTION ON THE LEVELS OF BULBAR AND SPINAL OPIATE BINDNG

D.A. Ramberg
T.L. Yaksh
B.M. Onofrio

Opiate receptors and enkephalin-containing neurons have been identified in the brainstem and spinal cord. Microinjection studies have confirmed that focal activation of opiate receptors in these regions can produce a blockade of pain transmission. To determine whether the relevant receptors in the brainstem may be associated with long spinal tracts, we examined the effect of cervical tractotomy on opiate binding. Cervical (C2) hemicordotomies were performed on 5 cats. Sham operated controls were used for comparison. After 1 to 3 weeks recovery time, the brainstem and lumbar spinal cord were assayed for stereospecific opiate binding by incubation of tissue samples with ^{3}H-dihydromorphine (0.6 nM), filtration and liquid scintillation counting. Upon sacrifice, the brainstem and spinal cord was frozen and the periaqueductal gray (PAG) and adjacent mesencephalic reticular formation (MRF), the medial and lateral pons and the medial and lateral medulla from the left and right sides were dissected. In addition, the lumbar spinal cord (L3-L7) was removed and dissected into left and right, dorsal and ventral quadrants. Statistically in the PAG, the MRF, the medial pons and medulla were observed. A 45% decrease in opiate binding was observed in the ipsilateral dorsal quadrant of the lumbar

spinal cord. The results showing a decrement in opiate binding following contralateral hemisection are consistent with the loss of opiate receptors on ascending projection systems in those areas known to receive terminals from spinothalamic and spinobulbar afferent tract systems known to be associated with nociceptive transmission and in areas known to be sensitive to morphine. Opiate receptors in these areas may therefore modulate nociceptive input by a local, selective action on rostral sensory transmission through the brainstem core.

9:20 a.m.

11. NEUROPEPTIDE LOCALIZATION IN THE FELINE SPINAL CORD FOLLOWING NERVE ROOT AVULSION INJURY

Possible explanation for the intractable pain syndrome

B.B. Lumenkopf
B. Nashold

Avulsion injuries to the human brachial plexus commonly result in an intractable pain in the involved extremities. In the past, a number of neurosurgical pain procedures were attempted, with generally poor success. Recently, Nashold et al have reported palliation following the creation of radiofrequency coagulation lesions along the dorsal root entry zone (DREZ) of the avulsed roots in their patients. This region has also been shown to possess high concentrations of neuropeptides, and their receptors, thought to be involved in the afferent nociceptive pathways.

We have developed a feline model of brachial plexus avulsion injury, performing extradural avulsions of the nerve roots of the lumbar enlargement. By immunohistochemistry, at various intervals following the injury, the distribution of three neuropeptides--methionine-enkephalin (ME), somatostatin (SS), and substance P (SP)--in the spinal cord segments at the level of the avulsion was investigated.

A relative imbalance among these neuropeptides appeared to exist in the DREZ at the level of simulated root avulsion injury. Somatostatin and SP were decreased early after avulsion injury on the avulsed side. Toward the later parts of the study, terminals containing these peptides began to reappear in the dorsal horn on the avulsed side. In contrast, ME initially was unchanged in the dorsal horn on the avulsed side. However, later in the study, these terminals were non-existent throughout the region of interest.

The known depressant actions of ME and SS on the nociceptive-responsive dorsal horn neurons, and the beneficial results following the DREZ lesion procedure, suggested to us that this localized neuropeptide imbalance may be involved in the pain syndrome following brachial plexus avulsion injury. The neuropeptides involved in the transmission of nociceptive information, their anatomical localizaton and physiological actions, are reviewed.

9:40 a.m.

12. CSF NEUROPEPTIDES IN PITUITARY TUMORS AND HYDROCEPHALUS

P. McL. Black
D. Carr
F. Beal
C. Coggins
J.B. Martin
H.T. Ballantine, Jr.
N. Zervas

We have examined the neuropeptides beta endorphin, somatostatin, and arginine vasopressin (AVP) in cerebrospinal fluid from patients with hydrocephalus and pituitary disorders, comparing them with control patients undergoing myelography. Samples collected from lumbar or ventricular puncture were maintained at -60° until their analysis by radioimmunoassay.

In two patients with hydrocephalus and three with pituitary tumors we were able to obtain sequential samples through a lumbar catheter. There were wide fluctuations, up to ten fold, in the beta endorphin values within hours during the day; these did not seem to represent diurnal variation. One patient, for example, had values of 194.22 pg/ml and 19.03 pg/ml on successive nights at the same time. Arginine vasopressin and somatostatin did not show such wide variation.

CSF beta endorphin by this assay was 20.9 ± 10.6 pg/ml in control patients. Very high values were found in two patients with pituitary disorders: one in a woman with a growth-hormone-producing microadenoma (255.26 pg/ml), the other in a woman with an unusual inflammatory pituitary and stalk disorder with diabetes insipidus (293.54 pg/ml). Patients with symptomatic hydrocephalus had a mean value of 21.5 pg/ml, comparable to controls. Random CSF values must be considered in light of the wide variations noted above, however.

Hydrocephalus and other brain disorders including pituitary

tumors were not associated with elevated somatostatin or vasopressin except in one case: this was a man with hydrocephalus and a large pituitary adenoma with hypernatremia and confusion. His CSF AVP was 3.9 pg/ml compared to our normal range of $1.3 \pm .5$ pg/ml.

These data suggest that hour-to-hour fluctuations in beta endorphin may occur in human CSF and that this peptide is not elevated in hydrocephalus. They further demonstrate that derangements in some peptides may be associated with pituitary disorders, perhaps through involvement with the hypothalamus.

10:00 a.m. **Coffee Break**

NEOPLASIA AND NEUROSURGERY

MODERATOR: C.B. WILSON

10:20 a.m.

13. THE SUBCHOROIDAL TRANSVELUM INTERPOSITUM APPROACH TO MID-THIRD-VENTRICULAR TUMORS

M.H. Lavyne
R.H. Patterson, Jr.

Radical excision of primary brain tumors located within the anterior to mid portions of the third ventricle has been largely unsuccessful in years past in part because of the surgeon's inability to safely visualize this region. Although the approach to the third ventricle through the foramen of Monro is suitable for small tumors, access to the mid portion of the third ventricle is poor unless the foramen is enlarged. Traditionally, this has been accomplished by sectioning the ipsilateral column of the fornix anteriorly and superiorly, which may result in a disabling loss of short term memory, especially if the contralateral fornix is compromised by tumor (1). Dandy described complete excision of a mid-third ventricular tumor after ligating one "lesser vein" of Galen (2). However, modern neurosurgeons have been hesitant to tamper with these veins, perhaps because McKissock (3) warned of the dangers of creating venous hypertension in the ipsilateral basal ganglia and internal capsule. We believe that this is not an important risk since adequate collateral circulation exists between the superficial cortical and deep medullary venous systems that drain the posterior frontal and basal ganglion regions. Hirsch (4) and Delandsheer (5) recently described their subchoroidal approach to the third ventricle and em-

phasized that one thalamostriate vein could be divided without risk. Viale (6) modified this approach to the third ventricle by operating between the thalamus and the ipsilateral internal cerebral vein without ligating the thalamostriate vein. We prefer to divide the thalamostriate vein and thereby enlarge the foramen of Monro posteriorly in order to gain access to the anterior and mid portions of the third ventricle. Our experience with eight successive cases managed in this fashion over the past three years has been excellent with zero morbidity and mortality. Two of our cases are presented in detail. The principal advantage of this procedure is that the fornix is preserved and memory function is not at risk.

1. Sweet, W.H.: Trans. Am. Neurol. Assoc. 84: 76-82, 1959.
2. Dandy, W.E.: Benign tumors in the Third Ventricle, 1933.
3. McKissock, W.: Brain 74: 1-9, 1951.
4. Hirsch, J.F.: Acta Neuroch. 47: 137-147, 1979
5. Delandsheer, J.M.: Neuroch. 24: 419-425, 1978.
6. Viale, G.L.: Surg. Neurol. 14: 71-76, 1980.

10:40 a.m.

14. INTRAMEDULLARY SPINAL CORD ASTROCYTOMAS OF CHILDHOOD

F. Epstein

Intramedullary spinal cord astroctyoma is a relatively uncommon neoplasm accounting for 4% of central nervous system tumors of childhood. Over the past 24 months we have operated on 25 children with spinal cord astrocytomas, 18 of which spanned the entire length of the spinal cord. It has become evident that in the pediatric age group "holocord" neoplasms are, in fact, more common than the relatively localized ones. This unusual series of patients has provided a unique opportunity to further understand the biology of this neoplasm, as well as its response to diverse methods of treatment.

It will be the purpose of this report to describe the entity of "holocord astrocytoma". This will include clinical presentation, neurodiagnostic investigation, surgical approach, microscopic pathology, and results of treatment.

It is hoped that information derived from this report will contribute to the formulation of neurosurgical consensus regarding optimal treatment.

11:00-Noon

CNS NEOPLASMS IN THE 80'S - A PANEL PRESENTATION AND OPEN DISCUSSION

MODERATOR: C. WILSON

11:00 a.m.

15. METASTASES OF ASTROCYTOMAS IN THE CENTRAL NERVOUS SYSTEM

M. Stern
J.F. Graham
P.E. McKeever
B.H. Smith
P.L. Kornblith

A retrospective analysis of central nervous system (CNS) metastases in intracranial astrocytomas and glioblastomas was undertaken to determine the frequency of CNS metastases of intracranial gliomas, the factors contributing to or preventing metastases, and the incidence of symptomatic metastases. Patient selection was dependent upon documentation of intracranial tumor pathology (astrocytoma or glioblastoma only), examination of pathologic specimens of the CNS distant from the primary tumor and availability of complete clinical summaries.

Forty-four patients met the selection criteria; this population was made up of 27 without metastases and 17 with metastases. Thirteen of 44 were women, although in the metastases group, 7 were women. The peak age of the metastases group was in the third through fifth decades while in the non-metastases group, the peak age was in the fifth through the sixth decades. The sites of metastases (in decreasing frequency) were brain stem, cerebellum, subarachnoid cisterns, thoracic spinal cord, cervical spinal cord, distant cerebral cortex, cauda equina, and sacral spinal cord. Fourteen of the 17 patients had multiple metastases; five of the 17 patients with metastases became symptomatic, 2 with irreversible paraplegia and the rest with cranial polyneuropathies secondary to perineural ensheathment by tumor or hydrocephalus due to CSF outflow obstruction. In the event of hydrocephalus in patients with gliomas, obstruction of CSF outflow is most likely due to subarachnoid metastases.

Surgical intervention was relevant to occurrence of metastases. The group with metastases had an average of 2.58 operative proce-

dures, whereas the non-metastases group had an average of 1.44 operative procedures. Metastases were not related to location of the primary tumor, whether deep, superficial, in the subarachnoid space or adjacent to or invading the ventricular system.

In summary, there is a significant incidence of distal CNS metastases in gliomas. If shunting is needed, CSF should be sent for cytology and cell culture as these tests may prove diagnostic. Spinal irradiation should be considered in treating spinal metastases. In the future, computerized tomography of the spinal cord may provide early localization for treatment.

11:10 a.m.

16. INTERMITTENT AND CONTINUOUS REGIONAL CHEMOTHERAPY FOR MALIGNANT BRAIN TUMORS

W.F. Chandler
H.S. Greenberg
W.D. Ensminger
T.W. Phillips

Data will be presented on our experience with three different types of regional chemotherapy for malignant CNS neoplasms. In addition our current plan for continuous intra-arterial radiosensitization will also be discussed.

Intermittent intra-arterial chemotherapy, primarily with high dose BCNU, has been performed 65 times in 26 patients. This has been mainly via one carotid artery, but has also been accomplished via the vertebral arteries. Intra-arterial Cis-platinum and AZQ have also been used in three patients. The rational, technique, complications, and results will be presented.

Continuous intra-carotid infusions of chemotherapeutic agents have been carried out in six patients. This technique has utilized the Infusaid implantable continuous infusion pump. This technique allows the addition of cycle-specific drugs to the intra-arterial regime. The rationale, drugs involved, and surgical technique will be presented.

Continuous intra-ventricular infusions of chemotherapeutic agents have been performed in thirteen patients, primarily for meningeal carcinomatosis. This technique also utilizes the implantable infusion pump, and has been used in patients when they have failed to clear their CSF with traditional bolus intrathecal chemotherapy. The technique and results will be presented.

Our plan and rationale for using the continuous intra-arterial infusion system for radiosensitization of malignant gliomas with BUdR will be discussed.

11:20 a.m.

17. QUANTITATIVE IMAGING OF BCNU IN GLIOMAS BY POSITRON EMISSION TOMOGRAPHY

W. Feindel
M. Diksic
L. Yamamoto
C. Thompson

Although BCNU has been widely used in the chemotherapy of gliomas, the uptake and retention of this chemical in the tumor and the surrounding brain in human gliomas is not known on a quantitative basis. Nor have we had any quantitative information on the fate of the chemical fractions derived from BCNU or their persistence in the tumor and brain. Since some but not all of these fractions are known to be cytotoxic it would be important to establish which of these remain in effective concentration within the tumor milieu.

In a preliminary study, BCNU labelled with positron emitting nitrogen-13 (T.1/2 = 10 minutes) or carbon-11 (T.1/2 = 20 minutes), the disposition of BCNU after intravenous administration of 15 mCi was mapped by positron emission tomography. Scans were made at 5 minute intervals of three horizontal cuts of the head registered simultaneously. Correction was made for the radioactive half life and the images analysed sequentially in a computer program developed for these data.

In 7 patients within two minutes after injection of the BCNU, the tumor showed 30 per cent less uptake than the normal cerebral cortex. Over the next half hour the drug built up in the tumor site to exceed the level in normal brain tissue. This is true also for the cystic components of the tumor. Uptake in the edematous cerebral cortex surrounding the tumor is less at the onset and never exceeds the level in normal brain tissue. A majority of the patients were also examined for regional cerebral blood flow and cerebral metabolic rate of glucose. Brief comparison of the three modes of scanning will be summarized.

11:30 a.m.

OPEN DISCUSSION - CNS NEOPLASMS: WHAT SHOULD WE BE DOING?

12:15 p.m.

PRESIDENT'S ADDRESS

B.C. Pevehouse

1:00 p.m.

LUNCHEON

AFTERNOON SESSION

MODERATORS: S. MULLAN, A. HUDSON

2:00 p.m.

18. EXPERIENCE WITH THE VENTRICULO-PLEURAL SHUNT

H.J. Hoffman
E.B. Hendrick
R.P. Humphreys

Ventriculo-pleural shunting for the management of hydrocephalus was initially introduced by Ransohoff in 1954. However, because of the reported cases of pleural effusion with this procedure, the operation has not received popularity in the management of hydrocephalus.

In the course of a review of 1,500 patients with hydrocephalus treated at the Hospital for Sick Children over the years 1960 to 1981, we encountered 59 patients who had been treated with a ventriculo-pleural shunt during the years 1971 to 1981. The commonest reason for insertion of the ventriculo-pleural shunt was a pre-existing infected ventriculo-peritoneal shunt. In addition, 9 patients had peritoneal adhesions, 2 had an ileal loop which made utilization of the peritoneal cavity difficult, 3 patients had necrotizing enterocolitis, 3 patients had bowel perforation by an existing ventriculo-peritoneal shunt and 2 had ascites.

Twelve of the 59 patients developed pleural effusion and 6 of these 12 patients were under 11 months of age. The incorporation of an anti-siphon device in the shunting system seemed to decrease the possibility of a pleural effusion. Twenty-three of the 59 patients continue to function on their inserted ventriculo-pleural shunt and in 9 of these the shunts have been functioning for over 5 years.

Ventriculo-pleural shunting seems to be a safe and simple form of diversionary CSF bypass. The risk of pleural effusion seems to be highest in the infant, but can occur at any age. However, even in the infant, the ventriculo-pleural shunt provides a good temporary site for diversion of CSF when the peritoneal cavity is contaminated or hazardous to shunt function.

Ventriculo-pleural shunting provides a valuable alternative for the management of hydrocephalus in those patients where the heart or the peritoneal cavity are unsuitable sites.

2:20 p.m.

19. VISUAL ANALOG SCALES FOR ASSESSMENT OF POSTOPERATIVE RESULTS

G. Ehni

Conventional methods of estimating pain and other subjective features of the postoperative state into four or five digital compartments, together with measurements of range of neck motion, reflexes and motor power yield outcome data not easily comparable with the results of others employing the same or different treatment modalities. The visual analog method entails careful construction of questions for patients to answer by marking a point on a 100 mm. line, the two extremities of which represent the least and the most or 0% and 100% of the symptom under inquiry. This frees the patient from making choices among words and provides him with an unlimited analog vocabulary. Such questionnaires have been found reliable, reproduceable and comparable with similar studies of others looking into the mood changing effect of drugs, pain relieving medication for rheumatoid arthritis and assessment of low back pain.

Such an inquiry was devised for 204 randomly selected patients operated upon for cervical radiculopathy and myelopathy between 1949 and 1980. Fifty-seven questionnaires were returned, including 25 from disk rupture patients, 27 from patients with spurs and five from patients with spondylotic myelopathy. This experience suggests that VAS questionnaire is a satisfactory and perhaps superior method of following treated patients, that it is interesting and easy for the patient to complete, is quickly scored and conveys a wealth of information in comparison with conventional questionnaires and complicated follow-up examinations of the patients.

2:40 p.m.

20. ATHEROSCLEROSIS OF THE SYMPATHETIC NERVOUS SYSTEM

S. Mullan

The topographical distribution of cerebrovascular atherosclerosis and of sympathetic fiber distribution brings up the question of a possible relationship.

Preliminary results in five rhesus monkeys fed an atherogenic diet for nine months after being given a unilateral cervical and lumbar sympathicectomy suggests that a relationship does exist. The animals have just been sacrificed. Histological studies have only begun but will be complete by the time of the meeting.

3:00 p.m.

21. SELECTIVE POSTERIOR RHIZOTOMY IN THE TREATMENT OF SPASTICITY

L.V. Laitinen
R. Fugl-Meyer

In 1976, Fasano et al (Neuro-Chirurgie 1976:22, 23) described a new technique of posterior rhizotomy for severe spasticity. They stimulated electrically the rootlets of the posterior roots D12-S1 and found that some of them responded to stimulation with spastic muscle jerks. These rootlets were cut, while those with a lesser or no reaction were saved.

We have used a similar technique in the treatment of eight patients with spasticity of the legs and one patient with spasticity of the arm. During surgery under general anesthesia all filaments of the posterior roots D12-S1 or C6-C8 were stimulated electrically (60 Hz, 6 V, 1 msec). Ca 60-80 per cent of the filaments responded to stimulation with muscle jerks and only these filaments were cut.

All nine patients showed a good objective reduction of spasticity. The residual cutaneous and joint sensation seemed to remain unchanged. No complications were observed.

Isokinetic dynamometry (Cybex II) demonstrated that plantar flexion torque of the operated ankles usually improved.

Subjectively, eight patients were satisfied with the result of surgery.

3:20 p.m.

22. NEUROSURGICAL ASPECTS OF COCCIDIOIDOMYCOSIS

A.G. Shetter
D. Fischer

Coccidioidomycosis is a fungal infection endemic to the southwestern United States. Although extrapulmonary dissemination is rare, this can be the source for considerable mortality and morbidity when it occurs. We reviewed 25 patients seen at the Barrow Neurological Institute from 1972-1982 for coccidioidomycosis involving the central nervous system or spinal column, with particular attention to the way in which neurosurgeons became involved in their diagnosis and care. There were 22 patients with coccidioidal meningitis, 2 with coccidioidal osteomyelitis of a vertebral body, and a single patient with an intracerebral coccidioidal abscess.

Half of the patients with meningitis gave no history of a prior coccidioidal infection and presented with nonspecific signs and symptoms of increased intracranial pressure or meningeal irritation. The CT scan was helpful in suggesting the correct diagnosis in these individuals. A majority of patients required surgery during some portion of their illness, including 10 who underwent a ventricular shunting procedure, 6 who had implantation of a drug delivery reservoir system, and 1 each who required transthoracic debridement of a vertebral body osteomyelitis and removal of an intracerebral abscess respectively. The incidence of shunt malfunctions and complications was high. The value of ventricular or cistera magna reservoirs to administer intrathecal Amphotericin B for the treatment of coccidioidal meningitis was unclear. A loculated 4th ventricle developed in 2 patients with ventriculoperitoneal shunts and may have contribued to their eventual clinical deterioration. Neurosurgeons play an important role in the care of patients with coccidioidomycosis of the nervous system and should be familiar with its natural history and treatment.

WEDNESDAY, OCTOBER 13

CEREBRAL VASCULAR DISEASE AND NEUROSURGERY

I. CEREBRAL VASOSPASM

MODERATOR: N. ZERVAS

8:00 a.m.

23. DOUBLE BLIND STUDY OF THE EFFECTS OF NIZOFENONE (Y-9179) ON CEREBRAL ISCHEMIA DUE TO VASOSPASM

K. Sano, I. Saito, H. Mizutani,
A. Tamura, T. Asano, N. Basugi

Nizofenone (Y-9179), a cerebral protective agent, was studied to evaluate the effect on cerebral ischemia due to vasospasm following aneurysmal rupture. This was a cooperative double-blind clinical trial with the participation of 6 hospitals. In this study, administration of drugs was initiated before vasospasm developed and continued for 5 days and, if vasospasm occurred, for an additional 5 days. Of a total of 100 cases, 10 cases (6 cases of the Nizofenone group and 4 of the placebo group) were excluded from the statistical analysis because their prognoses were judged to be determined mainly by factors other than vasospasm, such as complications during operation or during hospitalization. Out of the 42 cases in the Nizofenone group, 25 cases (59.5%) developed vasospasm though 13 of these 25 cases were given the drug according to the study design (the other 12 cases did not receive the scheduled full dosage of the drug), whereas, of the 48 cases in the placebo group, 29 (60.4%) showed cerebral vasospasm. Therefore, development of vasospasm was not prevented by administration of this drug.

Statistical analysis, however, revealed that the Nizofenone group exhibited a tendency of superiority over the placebo group ($p<0.1$) in the "disability status scale" one month after development of vasospasm. The 13 cases with vasospasm of the Nizofenone group which were given the drug exactly according to the study design showed better outcomes in the "disability status scale" ($p<0.05$), speech function ($p<0.1$), arm raising ($p<0.1$), finger flexion ($p<0.05$), and leg raising ($p<0.1$) as compared with the placebo group (29 cases). This double-blind study suggests that Nizofenone had a cerebral protective action against ischemia secondary to vasospasm following aneurysmal rupture, especially when the drug was administered before vasospasm developed.

8:20 a.m.

24. NIMODIPINE FOR CEREBRAL VASOSPASM– A DOUBLE BLIND RANDOMIZED STUDY

G.S. Allen

We assessed the efficacy and safety of nimodipine in 125 patients in a prospective, double-blind, randomized, placebo-controlled trial. Study drug (nimodipine or placebo) was give orally to patients within 96 hours of their subarachnoid hemorrhage and continued for 21 days. The patients prior to entry had their subarachnoid hemorrhage documented by CAT scan or lumbar puncture and an aneurysm documented by angiography. The patients were essentially neurologically normal upon entry to the study.

Our findings indicate that nimodipine is effective in markedly improving the neurological outcome by the end of the treatment period in patients who develop a neurological deficit from cerebral arterial spasm ($p<.05$). This conclusion is supported by an analysis of CAT scan and angiographic data. Nimodipine, at the dosage used in the study, does not alter to a statistically significant degree the occurrence of neurological deficits from cerebral arterial spasm.

8:40 a.m.

25. BASILAR ARTERY RESPONSES TO ADRENOCEPTOR AND PERIVASCULAR NERVE STIMULATION: RESULTS OF INTRACELLULAR RECORDING FROM THE ARTERIAL SMOOTH MUSCLE CELLS

G.D. Silverberg

Although intracranial arteries are innervated by nerves displaying characteristic catecholamine fluorescence, cerebral blood flow appears to be little affected by sympathetic stimulation or circulating catecholamines, and efforts to alter blood flow in pathological states, such as vasospasm, by sympatholytic drugs, alpha blockers or beta stimulators have had little success. In order to further explore the arterial nerve plexus function we have recorded from arterial smooth muscle cells during perivascular nerve stimulation and during application of adrenoceptor agonists and antagonists.

Rat basilar arteries were isolated in a tissue chamber bathed in physiological salt solution at 37°C. Nerve stimulation was provided by platinum electrodes placed on either side of the artery. Intracellular recordings were obtained by high resistance (150-280 megaohms) fine glass electrodes.

The smooth muscle cells had resting membrane potentials of 65-70 mV (internal negative). Perivascular nerve stimulation initiated excitatory junction potentials, (E.J.P.), depolarizations of the smooth muscle membrane. Increasing the stimulus voltage increased the amplitude of the EJP until an action potential in the arterial smooth muscle cell was generated. Action potentials were accompanied by arterial contraction.

Bath applied noradrenaline (1×10^{-6}M to 5×10^{-3}M) did not cause arterial contraction. EJP's could be evoked in the presence of noradrenaline in the bath. At the higher noradrenaline concentrations (2×10^{-4}M to 5×10^{-3}M) a dose-dependent membrane depolarization was seen. This depolarization was not affected by alpha or beta excitatory adrenoceptor blockade. Adrenalin, D-noradrenaline and dopamine had similar potency to L-noradrenaline while phenylephrine was about ten times less potent.

Our results show that (1) perivascular nerve stimulation evokes EJP's in the arterial smooth muscle cells. Action potentials can be generated and cause arterial constriction. (2) No pre or post synaptic alpha or beta excitatory adrenoceptors are present on this intracranial artery. (3) High concentrations of noradrenaline appear to be stimulating the post synaptic receptor (gamma receptor), which has characteristics different from alpha receptors. The physiological connections therefore are present for sympathetic control of intracranial arterial diameter through the perivascular sympathetic plexus but not by way of circulating catecholamines.

9:00 a. m.

II. ACADEMY SPECIAL SESSION: EARLY VS. DELAYED SURGERY FOR INTRACRANIAL ANEURYSMS AN OPEN DISCUSSION

MODERATOR: J. AUSMAN

K. Sano
S. Peerless
W. Hunt
S. Chou (Questioner)

9:45 a.m. **Coffee Break**

III. CEREBRAL VASCULAR OCCLUSIVE DISEASE

MODERATOR: J. AUSMAN

10:10 a.m.

26. PROXIMAL CAROTID LIGATION FOR INTRACRANIAL ANEURYSMS. A REAPPRAISAL

R. Heros

The initial reports of combined EC-IC bypass and proximal ICA ligation for unclippable I-C aneurysms were very encouraging. More recent reports, however, have emphasized the danger of ischemic complications. We have had two major embolic complications after ICA ligation with a gradual occlusion clamp for treatment of giant ophthalmic aneurysms. Both patients had a patent EC-IC graft at the time they suffered the embolic stroke. As a result of this experience, the literature on therapeutic carotid occlusion has been reviewed and an informal survey has been carried out among 30 neurosurgeons known to have a special interest in this field. This survey, together with the reported literature, provided data on 11 patients who suffered a stroke, probably as a result of embolism or propagation of the clot formed on the ICA, during or after ICA occlusion done in conjunction with an EC-IC bypass for treatment of an unclippable ICA aneurysm. Two of these complications occurred before full closure of a gradual occlusion clamp and the rest between 12 hours and 2 1/2 months after occlusion. None of the patients had been anticoagulated. In all but one the bypass graft was demonstrated to be patent at the time of the complication.

Pertinent information abstracted from the literature on therapeutic carotid occlusion can be summarized as follows: 1) occlusion of the ICA is associated wih a higher incidence of ischemic complications than CCA occlusion, 2) ICA occlusion is generally thought to be more effective in reducing the risk of future hemorrhage and the size of the aneurysm, but there is no proof of this fact in the literature, 3) the incidence of ischemic complications after carotid occlusion before EC-IC bypass was used was about 25% (slightly more with ICA and less with CCA ligation), however, many of these patients were treated after a recent SAH and, therefore, the effect of vasospasm was probably significant, 4) there is probably no substantial difference in safety or effectiveness between abrupt and gradual carotid occlusion, 5) at least 80% of the patients have sufficient collateral circulation to tolerate abrupt occlusion of either the ICA or the CCA, and 6) if vasospasm is eliminated as a factor, the majority of the ischemic complications seen during or after carotid occlusion are probably embolic in nature.

From our analysis of this problem, the following suggestions are tentatively offered: 1) every effort should be made to clip the aneurysm directly since the morbidity of indirect forms of treatment is high, 2) patients with unclippable aneurysms can be treated by abrupt ligation of the ICA either with a clamp or with a detachable balloon with the patient awake if there is physiologic and angiographic evidence of sufficient collateral circulation, 3) EC-IC and gradual occlusion of the ICA can be used in patients who do not tolerate test occlusion while awake or have physiologic and angiographic evidence of insufficient collateral circulation, 4) the patient should be anticoagulated with heparin during the period of occlusion and for a week thereafter unless they have had a recent SAH or a craniotomy within the last 5 days.

10:30 a.m.

27. SURGICAL OCCLUSION OF THE BASILAR AND VERTEBRAL ARTERIES: INDICATIONS AND RESULTS

S.J. Peerless
C.G. Drake

Giant aneurysms of the basilar and vertebral arteries frequently are not amenable to direct neck occlusion because of a broad inaccessible neck incorporating much of the parent artery, inclusion of critical branch vessels, a hard sclerotic wall or shear bulk of the aneurysmal mass making surgical approach impossible.

Faced with these problems, we have resorted to proximal, surgical occlusion of the basilar or vertebral arteries in 77 patients. This unusual experience includes 26 upper basilar artery occlusions, 17 lower basilar occlusions, 20 unilateral vertebral occlusions, and 14 bilateral vertebral artery occlusions. Overall, these techniques have been successful in 56 patients (73%). There have been 9 deaths and 11 poor results.

The angiographic and clinical features determining which vessel may be safely ligated will be detailed.

In an era of increasing surgical enthusiasm for vertebral-basilar insufficiency and surgical revascularization, this series offers a unique opportunity to examine the mechanisms, symptoms, signs and therapy of hind brain ischemia.

10:50 a.m.

28. MANAGEMENT OF INTERNAL CAROTID OCCLUSION

P. Heilbrun

From 1973 to 1979, 49 patients with internal carotid occlusion were evaluated and treated. Eighteen of 49 (9%) presented with TIA/PRIND, 14 of 49 (37%) with mild completed strokes, 13 of 49 (26%) with severe completed strokes, and 4 of 49 (4%) were asymptomatic. Surgical treatment consisting of EC-IC bypass, internal carotid stump reconstruction and endarterectomy to open the occulsion, contralateral endarterectomy for carotid stenosis opposite the occlusion, and iatrogenic carotid occlusion with EC-IC bypass was carried out on 22 (44%) patients considered at risk for ischemia based on angiographic evidence of poor collateral and potential sources of emboli. Medical treatment consisting of anticoagulants or antiplatelet aggregation agents was employed in 27 (56%) patients with good collateral circulation. By six weeks after initiation of treatment 10 of 49 (20%) reached end points of new strokes and death. By an average of 3 years of followup 30 or 49 (61%) reached the same end points. The results suggest that new ischemic events in the distribution of the occluded carotid occur infrequently if the angiographic study shows adequate collateral circulation to the ischemic territory at risk. Surgical revascularization should be reserved for patients with 1) recurrent ischemic events following the diagnosis of carotid occlusion and/or 2) patients with poor collateral.

11:10 a.m.

29. THE EFFECT OF HYPERBARIC OXYGENATION ON THE UPTAKE OF THALLIUM-201 IN PATIENTS WITH CEREBRAL ISCHEMIA

W.E. Brown, Jr.
J.L. Story
D.G. Changaris
T. Emhoff

Thallium-201 is biologically similar to the potassium ion and is transported across cell membranes by a mechanism that is energy dependent and related to the sodium-potassium pump. This isotope is a physiological marker and is concentrated in areas where the function of the sodium-potassium pump is normal. Because of these properties, it was felt that thallium-201 scanning, in conjunction with hyperbaric oxygenation, might be a useful method of identifying areas of cerebral ischemia amenable to improved metabolic state. This report summarizes our findings in four patients undergoing thallium scanning before and after exposure to hyperbaric oxygenation. Hyperbaric oxygenation was associated with increased cerebral thallium uptake in the patients whose neurologic deficits were thought to be the result of reversible cerebral ischemia. When the neurologic deficit was not thought to be attributable to reversible cerebral ischemia, hyperbaric oxygen had no appreciable effect upon thallium uptake. These results suggest that the thallium scanning, in conjunction with hyperbaric oxygenation, may be a means of assessing patients with cerebrovascular disease.

WILLIAM LUYENDIJK 1973
Pr Bernhardlaan 60
Oegstgeest, The Netherlands

WILLIAM MARGUTH 1978
Director, Department of Neurochirurgischen
Universität München
Marchioninistrasse 15
8000 München 70, West Germany

RAUL MARINO, JR. 1977
Rua Itaoeva
490, 11 Andar
01000 São Paulo, SP
Brazil

HELMUT PENZHOLZ 1978
Director Neurochirurgischen
Universitat Heidelberg
Gebaudes 110 im Neuenheimer Feld
6900 Heidelberg, West Germany

HANS-WERNER PIA 1978
Director
Zentrums fur Neurochirurgie
Universitat Giessen
Klinisktr. 37
6300 Giessen, West Germany

B. RAMMAMURTHI 1966
2nd Main Road G.I.T. Colony
Madras 4, India

KURT SCHURMANN 1978
Director
Neurochirurg
Univ-Klinik Mainz
Langenbeckstr 1
6500 Mainz, West Germany

CHARAS SUWANWELA 1972
Chulalongkorn Hospital
Medical School
Bangkok, Thailand

KJELD VAERNET — 1970
Righospitalets Neurokirurgis
Tagensvfj 18, 2200
Copenhagen, Denmark

SIDNEY WATKINS — 1975
The London Hospital
Whitechapel, London E 1
England

GAZI YASARGIL — 1975
Neurochirurgische
Universitatsklinik
Kantonsspital
8000 Zurich, Switzerland

DECEASED MEMBERS	DATE	ELECTED
DR. SIXTO OBRADOR ALCALDE (Honorary) Madrid, Spain	4/27/67	1973
DR. JAMES R. ATKINSON (Active) Phoenix, Arizona	2/78	1970
DR. PERCIVAL BAILEY (Honorary) Evanston, Illinois	8/10/73	1960
DR. WILLIAM F. BESWICK (Active) Buffalo, New York	5/12/71	1949
DR. SPENCER BRADEN (Active) Cleveland, Ohio	7/20/69	Founder
DR. F. KEITH BRADFORD (Active) Houston, Texas	4/15/71	1938
DR. WINCHELL McK. CRAIG (Honorary) Rochester, Minnesota	2/12/60	1942
DR. WESLEY A. GUSTAFSON (Senior) Jensen Beach, Florida	7/16/75	1942
DR. HANNIBAL HAMLIN (Senior)	6/28/82	1941

DR. HENRY L. HEYL (Senior) Hanover, New Hampshire	3/01/75	1951
DR. OLAN R. HYNDMAN (Senior) Iowa City, Iowa	6/23/66	1942
MR. KENNETH G. JAMIESON (Corresponding) Brisbane, Australia	1/28/76	1970
SIR GEOFFREY JEFFERSON (Honorary) Manchester, England	3/22/61	1951
DR. WALPOLE S. LEWIN (Corresponding) Cambridge, England	1/23/80	1973
DR. DONALD D. MATSON (Active) Boston, Massachusetts	5/10/69	1950
DR. KENNETH G. McKENZIE (Honorary) Toronto, Ontario, Canada	2/11/64	1960
DR. JAMES M. MEREDITH (Active) Richmond, Virginia	12/19/62	1946
DR. W. JASON MIXTER (Honorary) Woods Hole, Massachusetts	3/16/58	1951
DR. WILDER PENFIELD (Honorary) Montreal, Canada	4/05/76	1960
DR. RUPERT B. RANEY (Active) Los Angeles, California	11/28/59	1939
DR. DAVID L. REEVES (Senior) Santa Barbara, California	8/14/70	1939
DR. DAVID REYNOLDS (Active) Tampa, Florida	4/03/78	1964
R. EUSTACE SEMMES (Honorary) Memphis, Tennessee	3/2/82	1955
DR. SAMUEL R. SNODGRASS (Senior) Nashville, Indiana	8/08/75	1939

DR. C. WILLIAM STEWART (Corresponding) Montreal, Quebec, Canada	1948	1948
DR. GLEN SPURLING (Honorary) La Jolla, California	2/07/68	1942
DR. HENDRIK SVIEN (Active) Rochester, Minnesota	6/29/72	1957

AMERICAN ACADEMY OF NEUROLOGICAL SURGERY
1982 ANNUAL MEETING

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____Too low
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____Just about right

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Comments_____
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